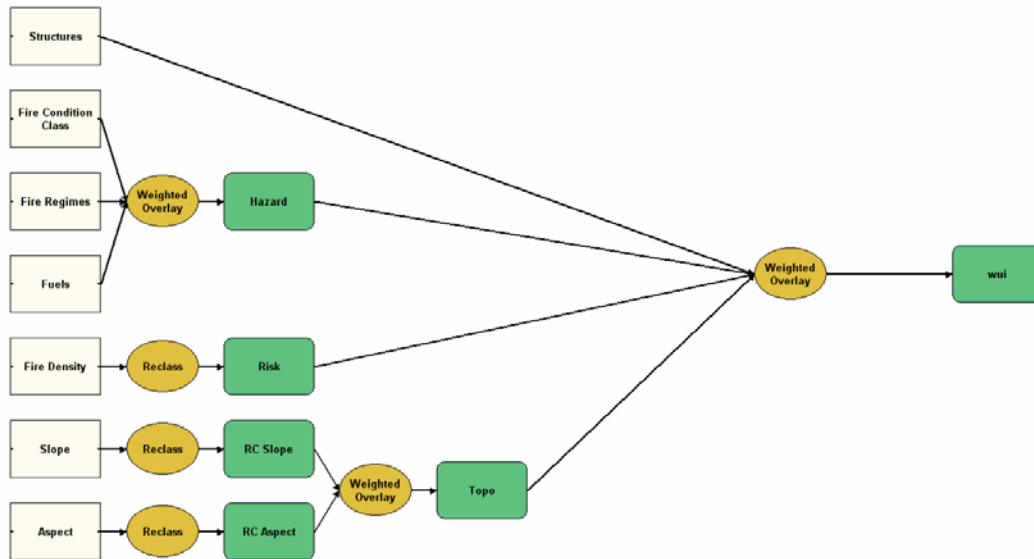


Arizona Wildland Urban Interface Assessment

2003



Prepared for the Arizona Interagency Coordination Group



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Abstract

Two course-scale 1-km resolution (subdivided to 250m), spatial data layers of Arizona was produced to support statewide level fire management planning. The Wildland Urban Interface layer represents places at risk with the influence of structure density. The Land Hazard layer represents places at risk when considering only the landscape hazard.

This paper documents the spatial model components used in the assessment. Managers can use the spatial data for state level fire planning.

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Background

Nationally, there is increasing concern over threats to communities by wildfires. Wildland fire is a common natural disaster in Arizona, with approximately 3,737 occurring annually and consuming 163,417 acres. The increasing growth of Arizona's rural populations, urban sprawl, and increasing wildland fuel loads adds to create a mix of situations that is known as the wildland urban interface (WUI).

Fire managers have been using Geographic Information Systems (GIS) as a tool to help assess various fire management issues. GIS allow fire managers to analysis spatial data such as slope, aspect, fuels, fire density, condition class, and housing density, as it relates to the wildland urban interface. The Arizona assessment uses GIS as a tool to analyze the WUI issue on a statewide basis.

The Wildland Urban Interface has been identified by various methods throughout the state of Arizona by various agencies. The Arizona WUI Assessment project is an attempt to conduct an analysis on a statewide basis using a common spatial model. The assessment was to validate those communities listed in the federal register and further identify possible other communities at risk.

The technologies required already exist and most of the data sets are available. This methodological study of the wildland-urban interface identified, mapped and quantified risk and hazards facing rural populations from wildland fires

The Arizona Interagency Coordination Group in cooperation with Arizona State Lands Department requested a WUI assessment be conducted. This project is a joint effort of Arizona State Land Department – Fire Management, USFS, BLM, NPS, FWS and BIA.

Assessment

The Wildland Urban Interface assessment is a statewide strategic report. The findings from the WUI assessment indicate areas that are at a low, moderate or high potential to be impacted, when a wildfire occurs. Data layers utilized in this assessment are coarse in scale. Results should not be interpreted down to an acre-by-acre basis. The assessment results provide indicators to managers on where more detailed assessments should take place.

This assessment uses technologies such as aerial imagery and geographic information systems to identify and map the risk posed by wildfire to residences in the wildland-urban interface. The WUI spatial model produces the data themes of wildfire risk, topography, fire hazard, and structure density. When combined, these themes produce a model of wildfire risk to residences in Arizona. It also indicates areas that should mitigate for wildfire hazards when development occurs. The data themes can be updated as more detailed and timely information becomes available.

The greatest influence on defining the urban interface problem, is where is there significant number of structures (HOUSE) and where there are fuel hazards. (HAZARD). These are the two factors in which we have the greatest influence over. We can decide where to put structures and how many. We can also alter the fuels around the structures and the condition of the fuels.

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Approach

The WUI assessment uses four main data layers comprised of Risk, Hazard, Topography and House Density to assess the wildland urban interface issue for Arizona.

TOPO –

- Aspect and Slope derived from 30 meter Digital Elevation Model (DEM) data from USGS.

Risk –

- Historical Fire Density using point data from fire record years 1986-1996 from all wildland agencies.

Hazard –

- Fuels, natural fire regimes and condition class.

House –

- House / Structures

A value rating of 1-15 was used for all layers. Weighing percentages were determined through discussion with the Arizona Interagency Coordinating Group.

The assessment for the Wildland Urban Interface model utilized the following formula:

$$WUI = (HOUSE*35\%)+(HAZARD*35\%)+(RISK*20\%)+(TOPO*10\%)$$

Slope	TOPO	WUI
Aspect		
Fuels	Hazard	
Fire Regimes		
Condition Class		
Fire Density	Risk	
	Houses	

GIS Metadata

- Projection: NAD27 Zone 12
- Grid data was converted to 250 meter cell size for all layers.

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TOPO

- TOPO theme was derived from 30m DEM USGS data for Arizona using aspect and slope.
- A weighted layer of: $\text{TOPO} = (\text{Aspect} \times 40\%) + (\text{Slope} \times 60\%)$, was used to create the TOPO theme.

Aspect

- Aspect is considered to have a lesser influence on fire behavior than slope.
- Aspect was reclassified into four directions (North, South, East, West)

Aspect	Label	Grid Designation
0-45	North	15
45-135	East	12
135-225	South	6
225-315	West	9
315-360	North	15

- Generally, fuel loadings are the greatest on north slopes and are the site is wetter, followed by East and then West. The fuel loading is the lightest and the driest sites are on the South facing aspects.
- Aspect is used in this model to help in influencing fuel loading based changes with aspect.
- A 1-15 value spread was utilized to be consistent with other theme layers.

Slope

- Reclassify the grid into five slope classifications
- Basic fire behavior modeling has for every 10-degree of slope adds 1 mile per hour to the Rate of Spread of the fire.
- As a general fire behavior rule for every 10% slope, 1mph is added to the rate of spread of the fire.

Slope	Label	Grid Designation
0-10	Flat – Slight	3
10-20	Mild	6
20-30	Moderate	9
30-40	Steep	12
+40	Extreme	15

By combining Aspect and Slope theme through a weighted formula of $(\text{Aspect} \times 40\%) + (\text{Slope} \times 60\%) = \text{TOPO}$.

Slope was given the higher weight due to its greater influence on fire behavior during worst case fire conditions.

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Risk (Fire Density)

- A simple density calculation through spatial analysis was used to create the fire density theme.
- Fire records from 1986 through 1996 of State and Federal wildland agencies were used.
- A 11 mile search radius was set
- All fire causes were used.
- Size of fire was not considered.

Fire History data:

(By State)	Person Caused Fires (PCF)	Person Caused Acres (PCA)	Lightning Caused Fires (LCF)	Lightning Caused Acres (LCA)	Total Fires (TF)	Total Acres (TA)
ARIZONA						
1992	2,353	33,770	1,603	7,836	3,956	41,606
1993	3,719	117,049	1,016	87,725	4,735	204,774
1994	2,469	40,793	2,110	182,106	4,579	222,899
1995	3,318	119,366	1,526	125,397	4,844	244,763
1996	1,747	89,916	2,033	98,271	3,780	188,187
1997	1,500	8,962	1,302	9,585	2,802	18,547
1998	2,317	43,432	916	7,718	3,233	51,150
1999	1,416	50,605	1,795	31,675	3,211	82,280
2000	1,407	45,657	2,172	37,239	3,579	82,896
2001	1,820	12,762	1,347	17,741	3,167	30,503
2002	1,833	599,383	1,385	30,493	3,218	629,876
Average	2,173	105,609	1,564	57,799	3,737	163,407

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Hazard Theme

The Hazard theme is a composite of Fuels, Fire Regime and Condition Class.

The three themes (Fuels, Fire Regimes, and Condition Class) were added through a weighted option.

$$\text{HAZARD} = (\text{FUELS} \times 50\%) + (\text{Fire Regime} \times 25\%) + (\text{Condition Class} \times 25\%)$$

This resulted in a HAZARD theme with a possible 0-15 classification.

Fuels

- Arizona GAP analysis vegetation communities were classified into NFFL fuel models.
 - The fuels map has not been field validated in all areas.
- The fuels theme was converted to 250m grid data.
- Large fires (Dude, Aspen, Rodeo, Bullock, Chedisky, etc), which have changed the fuels, were not taken into account in developing the fuels layer.
- Fuels projects, which have been completed, that have modified fuels around communities were not taken into account within the development of the fuels layer.
- Fuel models were assigned a grid value on a scale of 1-15, based on the potential fire behavior of that model as it relates to risk to structures.
- Urban, Water and Agricultural areas were assigned a zero rating.
- Identified Urban, water and agricultural areas in the fuels layer were used to in the fire regime and condition class layers to identify the same.

NFDRS Fuel Model	Fire Behavior Fuel Models (NFFL)						
	1	2	3	4	6	8	9
A (western annuals)	X						
U (open pine /grass)		X					
T (Sagebrush / grass)		X					
N (sawgrass – arrowweed)			X				
B (Mature Brush 6ft)				X			
F (Intermediate Brush)					X		
H (Fir)						X	
U (Closed Pine)							X

NFFL Fuel Model	Grid Value
1	03
2	05
3	07
4	11
6	13
8	09
9	15
Non fuel (water/agriculture/urban)	00

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Fire Regimes

- Fire Regime data theme was derived from a national assessment completed by the Rocky Mountain Research Station.
- Fire regime data was converted to 250m grid data.
- Fire regimes were set to a scale of 1-15.
- The more frequent fire cycles were given the higher grid value.
- The urban, water, industrial and agriculture areas identified in the GAPVEG layer were clipped and added into the fire regime and condition class layers. This was to add consistency between the fuels, fire regime and condition class layers.

Fire Regime	Grid Value
0-35 yrs Stand Replacement	15
0-35 yrs Low Severity	13
35-100 yrs Stand Replacement	10
35-100 yrs Mixed Severity	8
200+ Stand Replacement	5
Non Fuel (Water/agriculture/urban)	0

Fuel Condition Class

- Condition Class was derived from a national study completed by the Rocky Mountain Research Station.
- Condition Class was converted to 250m grid data.
- The urban, water, industrial and agriculture areas identified in the GAPVEG layer were clipped and added into the fire regime and condition class layers. This was to add consistency between the fuels, fire regime and condition class layers.
- The worst condition class areas were assigned the highest value. The more closely an area is to CC1 the more natural the fuel loading is expected to be.

Condition Class	Grid Value
Condition Class 3	15
Condition Class 2	10
Condition Class 1	5
Non Fuel (Water/agriculture/urban)	0

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House

The housing layer was developed off of the land status map. DOQQ's were utilized to determine if the land status polygon contained little to no structures, rural setting, medium or high number of housing. Other themes such as the USGS names, place names, towns were utilized to assist in locating populated areas. No attempt was made to count number of structures within a polygon. A visual determination was made and a rating applied.

- The house theme does contain the 100+ communities identified in the federal register as well as over 700 other places.
- Boundaries of places are not the legal boundaries. In some cases smaller communities were placed under a larger community's name.
- DOQQ's utilized were from three to seven years old. Current structure density may be greater where new development has occurred.
- 898 places / communities were identified in the house theme.
- Census data was reviewed. It was determined that the census blocks and tracts were not detailed enough for use in the rural areas of Arizona.

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Wildland Urban Interface

The final outcome of the WUI model utilizes a formula of:

$$\text{WUI} = (\text{HOUSE} \times 35\%) + (\text{HAZARD} \times 35\%) + (\text{RISK} \times 20\%) + (\text{TOPO} \times 10\%)$$

This resulted in a data layer with values in a scale of 1-15. This layer was further reclassified into high, medium and low risk.

The resulting output from the spatial model provides managers with a method of which to prioritize treatment areas and identify areas that should obtain more detailed assessment.. It does not prioritize with a category.

Reclassification Label	WUI point value
High	10-15
Moderate	7-9
Low	1-6

It is important to remember the influence of structures. Areas of high structure density rated higher than areas of scattered structures. That does not mean the scattered structures are not at risk. The model placed more importance in addressing high structure density areas before lower density areas.

One of the results of the model is some communities or places that were originally listed as high on the federal register list fell in rating. This is due to the influence on the house density layer to help assess priorities on where to start to address the WUI issue. Those structures existing in high fire danger areas are still at risk. The land hazard assessment more closely matches the federal register list.

Land Hazard

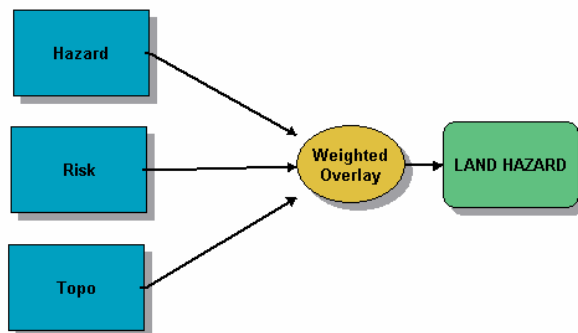
An additional assessment was conducted to answer the question of what the landscape would rate out without the influence of structures. It more simply can be stated as, what is the hazard of the landscape?

The same spatial data was utilized that was developed for the WUI assessment. The formula was changed to:

$$\text{LAND HAZARD} = (\text{HAZARD} * 70\%) + (\text{RISK} * 20\%) + (\text{TOPO} * 10\%)$$

The result is a map that indicates areas of low risk if a structure existed to areas of high risk if a structure was place in the landscape. This layer can be used to address the potential risk to any structure, independent of the size of the community.

The Land Hazard model more closely represents the list of communities from the Federal Register list. This is because many agencies did not consider weighing structure density. They inventoried and assessed if the structure was at risk.



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Conclusion

The Wildland Urban Interface assessment described in this paper successfully provided managers with a state level assessment of the wildland urban interface issue. The spatial model provided two methods to look at the Wildland Urban Interface issue.

- The Wildland Urban Interface assessment which is weighted by the structure density
- Land Hazard assessment which is independent of structure density and assesses only the lay of the land and fuels.

The methodology used could be applied to finer scale data. It can be modified to include other influencing inputs such as fuel treatments, or protection capabilities of an area.

Wildland Urban Interface Assessment Results

Federal Register List

The following table represents the assessment on the 2001 federal register listed places/communities. Because the assessment was done along ownership blocks, there is a multiple rating for some communities. The higher rating should be used to determine the assessment of the communities. The multiple rating is the result of different rating factors. The greatest influence is the housing and hazard layers.

Place	WUI POINTS RATING
Flagstaff	14High
Colcord Mountain Estates	13High
Forest Lakes Estates	13High
Pinetop	13High
Washington Park	13High
Alpine	12High
Groom Creek	12High
McNary	12High
Morman Lake	12High
North Rim Developed (Grand Canyon Village)	12High
Pine	12High
Pinetop/Lakeside	12High
Prescott	12High
San Carlos	12High
Show Low	12High
Strawberry	12High
Tonto Village	12High
Whiteriver	12High
Christopher Creek	11High
Crown King	11High
Eager	11High
Geronimo Estates Subdivision	11High
Heber	11High
Houston Mesa (Mesa Del Caballo Subdivison)	11High
Hunter Creek	11High
Jerome	11High
Juniper Heights (Prescott)	11High
Kingman	11High
Overgaard	11High
Payson	11High
Pinelake	11High
Summerhaven (Mt. Lemmon)	11High
Ellison Creek Estates	10High
Grand Canyon Village	10High
Greer	10High
Hawley Lake	10High
Hon-Dah	10High

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Place	WUI POINTS	RATING
Mount Lemmon	10	High
Nutrioso	10	High
Oak Creek	10	High
Oracle	10	High
Peridot	10	High
Pinewood (Munds Park)	10	High
Supai	10	High
Tonto Apache	10	High
Tusayan	10	High
Vernon	10	High
Yavapai Prescott	10	High
Camp Geronimo	9	Moderate
Camp Verde	9	Moderate
Cottonwood	9	Moderate
Deer Springs	9	Moderate
Desert View	9	Moderate
Fort Huachuca	9	Moderate
Globe	9	Moderate
Hunters Point	9	Moderate
Kaibab	9	Moderate
Keams Canyon	9	Moderate
Kitt Peak	9	Moderate
Kohl's Ranch	9	Moderate
Linden	9	Moderate
New River	9	Moderate
Nogales	9	Moderate
Parks	9	Moderate
Pleasant Valley	9	Moderate
Santa Cruz	9	Moderate
Sierra Vista	9	Moderate
St. John	9	Moderate
Thompson Draw	9	Moderate
Verde Glen	9	Moderate
Williams	9	Moderate
Arivaca	8	Moderate
Diamond Point Shadow	8	Moderate
Globe - Miami	8	Moderate
Mingus Mountain	8	Moderate
Mount Graham	8	Moderate
Paradise	8	Moderate
Patagonia	8	Moderate
Pinedale	8	Moderate
Point of Pines	8	Moderate
Rose Creek Lodge	8	Moderate
Star Valley	8	Moderate
Whispering Pines	8	Moderate
Yuma	8	Moderate

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Place	WUI POINTS	RATING
Aravaipa Creek	7	Moderate
Cherry	7	Moderate
Cutter	7	Moderate
Golden Shore	7	Moderate
Jeddito	7	Moderate
Kaibab Lodge	7	Moderate
Littlefield	7	Moderate
Pine Springs	7	Moderate
Ponderosa Springs	7	Moderate
Portal	7	Moderate
Rose Creek YMCA	7	Moderate
San Pedro area	7	Moderate
Second Mesa	7	Moderate
Third Mesa	7	Moderate
Yaki Point	7	Moderate
Yuma area	7	Moderate
North Rim Historic	6	Low
Polacca	6	Low
Summit	6	Low
Tsaile	6	Low
West Turkey Creek	6	Low
Maricopa Colony	5	Low
San Pedro	5	Low
Chircahua Headquarters	4	Low
Cibola	4	Low
Oak Springs	4	Low
Lochiel - Parker Canyon	3	Low
Sasabe	3	Low

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Places Not Listed on the Federal Register

Place	WUI POINTS	RATING
Downy Park	14	High
Bellmont	13	High
Black Hill Park	12	High
Ehrenberg	12	High
Fort Terrell	12	High
Highland Park	12	High
Lake of the Woods	12	High
Lakeview	12	High
Ponderosa Park	12	High
Wispering Pines subdivision	12	High
Beaver Valley	11	High
Bisbee	11	High
Cave Creek	11	High
Cibecue	11	High
Clifton	11	High
Deering Park Estates	11	High
Flowing Spring subdivison	11	High
Freedom Acres	11	High
Ganado	11	High
Hillside	11	High
Humbolt	11	High
Mountaineire	11	High
Oxbow	11	High
Peach Springs	11	High
Red Rock	11	High
Sedona	11	High
Wilhoit	11	High
Baha Ranch	10	High
Blue Hill Farms	10	High
Canyon Day	10	High
Chandler	10	High
Congress	10	High
East Fork	10	High
Fort McDonald	10	High
Jacob Lake	10	High
Mayer	10	High
Munds Park	10	High
Navajo Army Depot	10	High
Northwoods	10	High
Riordan	10	High
Sevenmile	10	High
Snowflake	10	High
Springerville	10	High
Stoneman Lake	10	High

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Place	WUI POINTS	RATING
Sun Lakes	10	High
Taylor area	10	High
Tonto Estate	10	High
Tonto Village area	10	High
White Mountain Lakes Estates	10	High
Window Rock	10	High
Antares area	9	Moderate
Apache Junction	9	Moderate
Aultman	9	Moderate
Bagdad	9	Moderate
Bear Flat	9	Moderate
Bellevue area	9	Moderate
Bignotti	9	Moderate
Bylas	9	Moderate
Canes Bed	9	Moderate
Carrizo	9	Moderate
Ceder Creek	9	Moderate
Centerville	9	Moderate
Chinle	9	Moderate
Chino Valley	9	Moderate
Clarksdale	9	Moderate
Clear Creek	9	Moderate
Clemenceau	9	Moderate
Colorado City	9	Moderate
Concho	9	Moderate
Cornville	9	Moderate
Douglas	9	Moderate
Elden Pueblo	9	Moderate
Fort Defiance	9	Moderate
Fountain Hills	9	Moderate
Fredonia	9	Moderate
Gila Crossing	9	Moderate
Glen Ilah	9	Moderate
Golden Valley	9	Moderate
Greasewood	9	Moderate
Hannigan Meadow	9	Moderate
Holbrook	9	Moderate
Huachuca City	9	Moderate
Joseph City	9	Moderate
Kayenta	9	Moderate
Kearny	9	Moderate
Kehl Spring	9	Moderate
Komatke	9	Moderate
Lake Montezuma	9	Moderate
Lockett Lake area	9	Moderate
Low Mountain	9	Moderate
Macks Crossing area	9	Moderate

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Place	WUI POINTS	RATING
Maricopa	9	Moderate
Miami	9	Moderate
Middle Verde	9	Moderate
Nicksville	9	Moderate
Peeples Valley	9	Moderate
Phillips Ranch	9	Moderate
Phoenix	9	Moderate
Phoenix metro area	9	Moderate
Pinal	9	Moderate
Pinon	9	Moderate
Platesite	9	Moderate
Prescott Valley	9	Moderate
Roosevelt Lake Gardens East	9	Moderate
Rye	9	Moderate
Sacaton	9	Moderate
Santan	9	Moderate
Seligman	9	Moderate
Sherwood Estates	9	Moderate
Shumway	9	Moderate
Silver Creek	9	Moderate
Snowflake area	9	Moderate
Sponseller	9	Moderate
Spring Valley	9	Moderate
Taylor	9	Moderate
Tombstone	9	Moderate
Truxton	9	Moderate
Tuba City	9	Moderate
Tucson Metro Area	9	Moderate
Verde	9	Moderate
Whitetail	9	Moderate
Wilcox	9	Moderate
Wingfield	9	Moderate
Winslow	9	Moderate
Young	9	Moderate
Aguila	8	Moderate
Antares	8	Moderate
Aripine	8	Moderate
Bellevue	8	Moderate
Benson	8	Moderate
Bitter Springs	8	Moderate
Black Canyon City	8	Moderate
Blue	8	Moderate
Bridgeport	8	Moderate
Bullhead City	8	Moderate
Bumstead	8	Moderate
Campo Bonito	8	Moderate
Catalina	8	Moderate

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Place	WUI POINTS	RATING
Chandler Heights	8	Moderate
Christmas	8	Moderate
Cienega Springs	8	Moderate
Clay Springs	8	Moderate
Coconino	8	Moderate
Colorado City area	8	Moderate
Continental	8	Moderate
Cordes	8	Moderate
Courtland	8	Moderate
Deer Village Subdivison	8	Moderate
Dehorn	8	Moderate
Dewey	8	Moderate
Dolan Springs	8	Moderate
Duquesne area	8	Moderate
Fort Apache Junction	8	Moderate
Fort Mohave	8	Moderate
Fortuna Hills	8	Moderate
Gibson	8	Moderate
Gila Bend	8	Moderate
Grapevine area	8	Moderate
Green Valley	8	Moderate
Jakes Corner	8	Moderate
Kelvin	8	Moderate
Kinney Junction	8	Moderate
Maine	8	Moderate
Mammoth	8	Moderate
Marana	8	Moderate
Maverick	8	Moderate
Meadview	8	Moderate
Mesa	8	Moderate
Mojave City	8	Moderate
Naco	8	Moderate
Navajo Gospel Mission	8	Moderate
North Rim	8	Moderate
Oatman	8	Moderate
Ocotillo	8	Moderate
Old Leupp	8	Moderate
Page	8	Moderate
Penzance	8	Moderate
Pertleville	8	Moderate
Pumpkin Center	8	Moderate
Queen Creek	8	Moderate
Rimmy Jims	8	Moderate
Rio Rico SE	8	Moderate
Rio Verde	8	Moderate
Riverside	8	Moderate
Riverside Acres	8	Moderate

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Place	WUI POINTS	RATING
Riviera	8	Moderate
Roosevelt Lake Garden West	8	Moderate
Safford	8	Moderate
Sahuarita	8	Moderate
Salome	8	Moderate
San Luis	8	Moderate
Somerton	8	Moderate
Soniotia	8	Moderate
Sprucedale	8	Moderate
Stargo	8	Moderate
Stockton	8	Moderate
Tees Toh	8	Moderate
Tubac	8	Moderate
Tutt	8	Moderate
Vail	8	Moderate
Vernon area	8	Moderate
Wickenburg	8	Moderate
Willow Camp	8	Moderate
Winkelman	8	Moderate
Young Tank area	8	Moderate
Ak Chin	7	Moderate
Anthem	7	Moderate
Arizola	7	Moderate
Arizona City	7	Moderate
Ash Fork	7	Moderate
Ashfork	7	Moderate
Audley	7	Moderate
Bisbee area	7	Moderate
Bisbee Douglas International Airport	7	Moderate
Bisbee Junction	7	Moderate
Blue Ranger Station	7	Moderate
Bowie	7	Moderate
Buckeye	7	Moderate
Bumble Bee	7	Moderate
Burton	7	Moderate
Carefree	7	Moderate
Casa Grande	7	Moderate
Casa Grande area	7	Moderate
Case Grande	7	Moderate
Cedar Creek Cross	7	Moderate
Chambers	7	Moderate
Chetco Sanders	7	Moderate
Cleaveland	7	Moderate
Cochise	7	Moderate
Coolige	7	Moderate
Cordes Lakes	7	Moderate
Crozier	7	Moderate

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Place	WUI POINTS	RATING
Davis Dam	7	Moderate
Deer Tank Wash	7	Moderate
Dewey area	7	Moderate
Dos Cabezas	7	Moderate
Douglas area	7	Moderate
Dragoon	7	Moderate
Dugas	7	Moderate
Duquesne	7	Moderate
Elfrida	7	Moderate
Feaster	7	Moderate
Feaster area	7	Moderate
Florence	7	Moderate
Fort McDowell	7	Moderate
Frazier Wells	7	Moderate
Freedom Acres Subdivison	7	Moderate
Ft. Thomas	7	Moderate
Gilbert	7	Moderate
Gisela	7	Moderate
Guadalupe	7	Moderate
Hackberry	7	Moderate
Hawkins	7	Moderate
Hayden	7	Moderate
Hidden Valley	7	Moderate
Higley	7	Moderate
Houck	7	Moderate
Jordan	7	Moderate
K Bar / Coleman Ranch	7	Moderate
King Ranch	7	Moderate
Kykotsmovi	7	Moderate
Lake Havasu City	7	Moderate
Lakeview Trailer Park	7	Moderate
Leche-e Chapter	7	Moderate
Lupton	7	Moderate
Maish Vaya	7	Moderate
Martinez Ranch	7	Moderate
McGuireville	7	Moderate
McMillianville	7	Moderate
McNeal	7	Moderate
Mescal	7	Moderate
Mint	7	Moderate
Moccasin	7	Moderate
Na Ah Tee	7	Moderate
Navajo Mountain Mission	7	Moderate
Oak Wells	7	Moderate
One Mile	7	Moderate
Palominas	7	Moderate
Paridise Valley	7	Moderate

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Place	WUI POINTS	RATING
Parker	7	Moderate
Parson Grove	7	Moderate
Paulden	7	Moderate
Perryville	7	Moderate
Piedmont	7	Moderate
Pierkinsville	7	Moderate
Pimoca Two	7	Moderate
Pomerene	7	Moderate
Punkin Center	7	Moderate
Quartsite	7	Moderate
Queen Valley	7	Moderate
Quivero	7	Moderate
Rancho Del Escondido	7	Moderate
Ray Place	7	Moderate
Red Lakes	7	Moderate
Red Rock Tank area	7	Moderate
Robbers Roost	7	Moderate
Rock Creek	7	Moderate
Ruby	7	Moderate
Ryan	7	Moderate
San Manuel	7	Moderate
Sawmill	7	Moderate
Scottsdale	7	Moderate
Sedona area	7	Moderate
Seneca	7	Moderate
Sherwood Forest Estates	7	Moderate
Shonto	7	Moderate
Six Mile Village	7	Moderate
Skull Valley	7	Moderate
Solomon	7	Moderate
South Santan	7	Moderate
St. Michaels	7	Moderate
Stringfield	7	Moderate
Sunflower	7	Moderate
Sunsites	7	Moderate
Superior	7	Moderate
Sweetwater	7	Moderate
Teec Nos Pos Chapter House	7	Moderate
Tempe	7	Moderate
Thatcher	7	Moderate
Tin Mountain	7	Moderate
Tonto Hills	7	Moderate
Valle	7	Moderate
Waddell	7	Moderate
Wahweep	7	Moderate
Walnut Grove	7	Moderate
Wenden	7	Moderate

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Place	WUI POINTS	RATING
Wildcow Campground	7	Moderate
Willma	7	Moderate
Wilmot	7	Moderate
Yampai	7	Moderate
Zeniff area	7	Moderate
Adamana	6	Low
Allentown	6	Low
Arcosanti	6	Low
Arivaca Junction	6	Low
Arlington	6	Low
Artesia	6	Low
Baby Rocks	6	Low
Bernardino	6	Low
Bidahochi	6	Low
Big Lue Ranch	6	Low
Blackwater	6	Low
Bonita	6	Low
Boulder Inn	6	Low
Bouse	6	Low
Brenda	6	Low
Buena Vista	6	Low
Campo	6	Low
Canyon Diablo	6	Low
Casa Blanca	6	Low
Cedar Springs	6	Low
Central	6	Low
Cerbat	6	Low
Chilchinbito	6	Low
Cibola area	6	Low
Circle City	6	Low
Cleator	6	Low
Cliff Dweller Lodge	6	Low
Copper Hill	6	Low
Corona de Tucson	6	Low
Cow Springs	6	Low
Desert Hills	6	Low
Diamond Bell Ranch	6	Low
Dilkon	6	Low
Double Adobe	6	Low
Dudleyville	6	Low
Duncan	6	Low
El Tule	6	Low
Five Houses	6	Low
Franklin	6	Low
Gadsden	6	Low
Gladden	6	Low
Grasshopper Junction	6	Low

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Place	WUI POINTS	RATING
Grey Mountain	6	Low
Harcuvar	6	Low
Harris	6	Low
Havasu Spring	6	Low
Headquarters	6	Low
Heaton	6	Low
Hidden Spring Mission	6	Low
Hidden Valley area	6	Low
Horse Mesa	6	Low
Hunt	6	Low
Indian Gardens	6	Low
Indian Wells	6	Low
Jops Landing	6	Low
Katherine	6	Low
La Paz Valley	6	Low
Lebanon	6	Low
Leupp Corner	6	Low
Manzoro	6	Low
Marble Canyon	6	Low
McConnico	6	Low
McNeal area	6	Low
Mesquite	6	Low
Meteor City	6	Low
Moenave	6	Low
Morristown	6	Low
Mt. View	6	Low
Navajo	6	Low
Nazlini	6	Low
Oro Valley area	6	Low
Paul Spur	6	Low
Paul Spur area	6	Low
Pearce	6	Low
Pinaveta	6	Low
Poston	6	Low
Rough Rock	6	Low
RRR Ranch	6	Low
Sacaton Flats	6	Low
Sahuarita Heights	6	Low
Salado	6	Low
San Lucas Village	6	Low
San Manual	6	Low
San Simon	6	Low
Sells	6	Low
Sil Nakya	6	Low
Siovi Shuatak	6	Low
Soapbox Canyon	6	Low
Stanfield	6	Low

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Place	WUI POINTS	RATING
Steamboat Canyon	6	Low
Sun Valley	6	Low
Sunizona	6	Low
Sunrise	6	Low
Sunshine	6	Low
Tahchee	6	Low
Tanner Springs	6	Low
Tin House	6	Low
Tonopah	6	Low
Toyei	6	Low
Tsegi	6	Low
Tumacacori	6	Low
Twin Buttes	6	Low
Two Guns	6	Low
Valencia	6	Low
Valentine	6	Low
Valle Siding	6	Low
Wahweap	6	Low
Walapai	6	Low
Walpi	6	Low
Wellton	6	Low
White Hills	6	Low
Why	6	Low
Wikiup	6	Low
Willow Springs	6	Low
Wintersburg	6	Low
Wittmann	6	Low
Woodruff	6	Low
Yuca	6	Low
Agua Caliente	5	Low
Ahan Owuch	5	Low
Ak Chut Vaya	5	Low
Ak Komel	5	Low
Alto	5	Low
Amado	5	Low
Apache	5	Low
Artesa	5	Low
Asher	5	Low
Asher area	5	Low
Avari area	5	Low
Aztec	5	Low
Barkerville	5	Low
Big Reef Mill	5	Low
Blaisdell	5	Low
Blake Place	5	Low
Blue Gap	5	Low
Bradberry	5	Low

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Place	WUI POINTS	RATING
Calumet	5	Low
Calva	5	Low
Cardarzo	5	Low
Case del Oro	5	Low
Catus Flat	5	Low
Cazador	5	Low
Cazador area	5	Low
Centenial	5	Low
Chair Crossing	5	Low
Charco	5	Low
Chiawuli Tak	5	Low
Childs	5	Low
Chiricahua	5	Low
Chloride area	5	Low
Chouhc	5	Low
Chuichu	5	Low
Chukson	5	Low
Chukut Kuk	5	Low
Chutum Vaya	5	Low
Chuwut Murk	5	Low
Coal Mine Mesa	5	Low
Comobabi	5	Low
Conger	5	Low
Coolidge Dam	5	Low
Cork	5	Low
Cornfield	5	Low
Cortero	5	Low
Cowlic	5	Low
Crookton	5	Low
Cyclopic	5	Low
Dateland	5	Low
de la Oso Rancho	5	Low
Del Rio	5	Low
Desert Wells	5	Low
Diamond Fields	5	Low
Dixie	5	Low
Dobson area	5	Low
Dolan Springs area	5	Low
Dome	5	Low
Dome area	5	Low
Double Adobe area	5	Low
Douglas Monitoring Station	5	Low
Drexell Heights - Tucson	5	Low
Duval	5	Low
Elfrida area	5	Low
Emery	5	Low
Enid	5	Low

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Place	WUI POINTS	RATING
Flat Rock	5	Low
Florence Junction	5	Low
Fordville/Tiger	5	Low
Forepaugh	5	Low
Fortuna Hills area	5	Low
Freeman	5	Low
Gadsden area	5	Low
Geronimo	5	Low
Gila Bend area	5	Low
Gleason	5	Low
Gleeson	5	Low
Glenbar	5	Low
Gold Canyon Ranch	5	Low
Greenwood	5	Low
Gu Oidak	5	Low
Guthrie	5	Low
Haivana Nakya	5	Low
Herchede Ranch	5	Low
Hickiwan	5	Low
Hoi Oidak	5	Low
Honeyhill	5	Low
Horn	5	Low
Hortons Place	5	Low
Humbug	5	Low
Hyder	5	Low
Johnson	5	Low
Kaibito	5	Low
Kaka	5	Low
Kim	5	Low
Kimble Ranch	5	Low
Kinter	5	Low
Klagetoh	5	Low
Klondyke	5	Low
Kofa	5	Low
Kuakatch	5	Low
Kupk	5	Low
La Palma area	5	Low
Laguna area	5	Low
Ligurta area	5	Low
Lukeville	5	Low
Makgum Havoka	5	Low
Marana area	5	Low
Maricopa Village	5	Low
Martinez Lake	5	Low
Matthie	5	Low
McMicken	5	Low
McNeal Generating Plant	5	Low

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Place	WUI POINTS	RATING
McNeal Generating Plant area	5	Low
Mesa Well	5	Low
Narcho Santos	5	Low
Nelson	5	Low
New Hope	5	Low
Noah	5	Low
Norton	5	Low
Oak Ranch	5	Low
Old Tucson area	5	Low
Olga	5	Low
Palo Verde	5	Low
Palomas	5	Low
Pan Tak	5	Low
Pantano	5	Low
Papago Farm area	5	Low
Picacho area	5	Low
Pima	5	Low
Pima area	5	Low
Pinoh	5	Low
Pioneer	5	Low
Pipyak	5	Low
Portal area	5	Low
Poston area	5	Low
Powell area	5	Low
Puerto Cielo	5	Low
Rare Metal	5	Low
Red Lake Chapter House	5	Low
Red Mesa	5	Low
Redington	5	Low
Richville	5	Low
Rillito	5	Low
Rincon	5	Low
Rincon area	5	Low
Rose Well Camp	5	Low
Round Rock	5	Low
Salina	5	Low
San Jose	5	Low
San Luis area	5	Low
San Simon area	5	Low
San Xavier	5	Low
Santa Rosa	5	Low
Santa Rosa area	5	Low
Schuchk	5	Low
Schuchuli	5	Low
Secundino	5	Low
Sentinel	5	Low
Sheldon	5	Low

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Place	WUI POINTS	RATING
Sikort Chuapo	5	Low
Sikul Himatk	5	Low
Silver Bell	5	Low
Sivili Chuchg	5	Low
Skoksonak	5	Low
Somerton area	5	Low
Sonora	5	Low
St. Davids	5	Low
Stan Shuatuk	5	Low
Stanford Ranch	5	Low
Sunset	5	Low
Swift Trail Junction	5	Low
Tacna	5	Low
Tacna area	5	Low
Tat Momili	5	Low
Tatk Kam Vo	5	Low
Teec Nos Pos	5	Low
Three Way	5	Low
Topawa	5	Low
Tortilla Flat	5	Low
Totacon	5	Low
Totopitk	5	Low
Trail Tank area	5	Low
Tucson Estates area	5	Low
Tuweep	5	Low
Uhs Kug	5	Low
Utting	5	Low
Vaiva Vo	5	Low
Vamori	5	Low
Vaya area	5	Low
Vicksburg Junction	5	Low
Wahak Hotrontk	5	Low
Wellton area	5	Low
Wheatfields	5	Low
Whetstone	5	Low
Wide Ruins	5	Low
Willow	5	Low
Wooden	5	Low
Yarnell	5	Low
Yava	5	Low
Yolk	5	Low
Yuma area	5	Low
Ali Chuk	4	Low
Ali Molina	4	Low
Ali Oidak	4	Low
Altos	4	Low
Angell	4	Low

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Place	WUI POINTS	RATING
Ashurst	4	Low
Big Horn	4	Low
Bryce	4	Low
Bullhead City Airport	4	Low
Carmen	4	Low
Casa Rosa	4	Low
Cascabell	4	Low
Castle Dome area	4	Low
Castle Hot Springs	4	Low
Cedar Ridge	4	Low
Chico Shunie	4	Low
Chiuli Shaik	4	Low
Citrus Park	4	Low
Drake	4	Low
Eden	4	Low
Emmanuel Mission	4	Low
Feldman	4	Low
Franconia	4	Low
Government Hill	4	Low
Griffith	4	Low
Gripe	4	Low
Gu Chuapo	4	Low
Gu Vo	4	Low
Haivan Vaya	4	Low
Hashan Chuchg	4	Low
Havasu City Airport	4	Low
Hoa Murk	4	Low
Hope	4	Low
Itak	4	Low
IV Bar Tank	4	Low
Jackrabbit House	4	Low
Kimball	4	Low
Kinlichee	4	Low
Kino Springs	4	Low
Kohatk	4	Low
Kom Vo	4	Low
Komak Wuacho	4	Low
Lake Havasu area	4	Low
Leupp	4	Low
Love	4	Low
Luzena	4	Low
Manny Farms	4	Low
McVay	4	Low
Mica	4	Low
Morgantown	4	Low
Nolic	4	Low
North Komelik	4	Low

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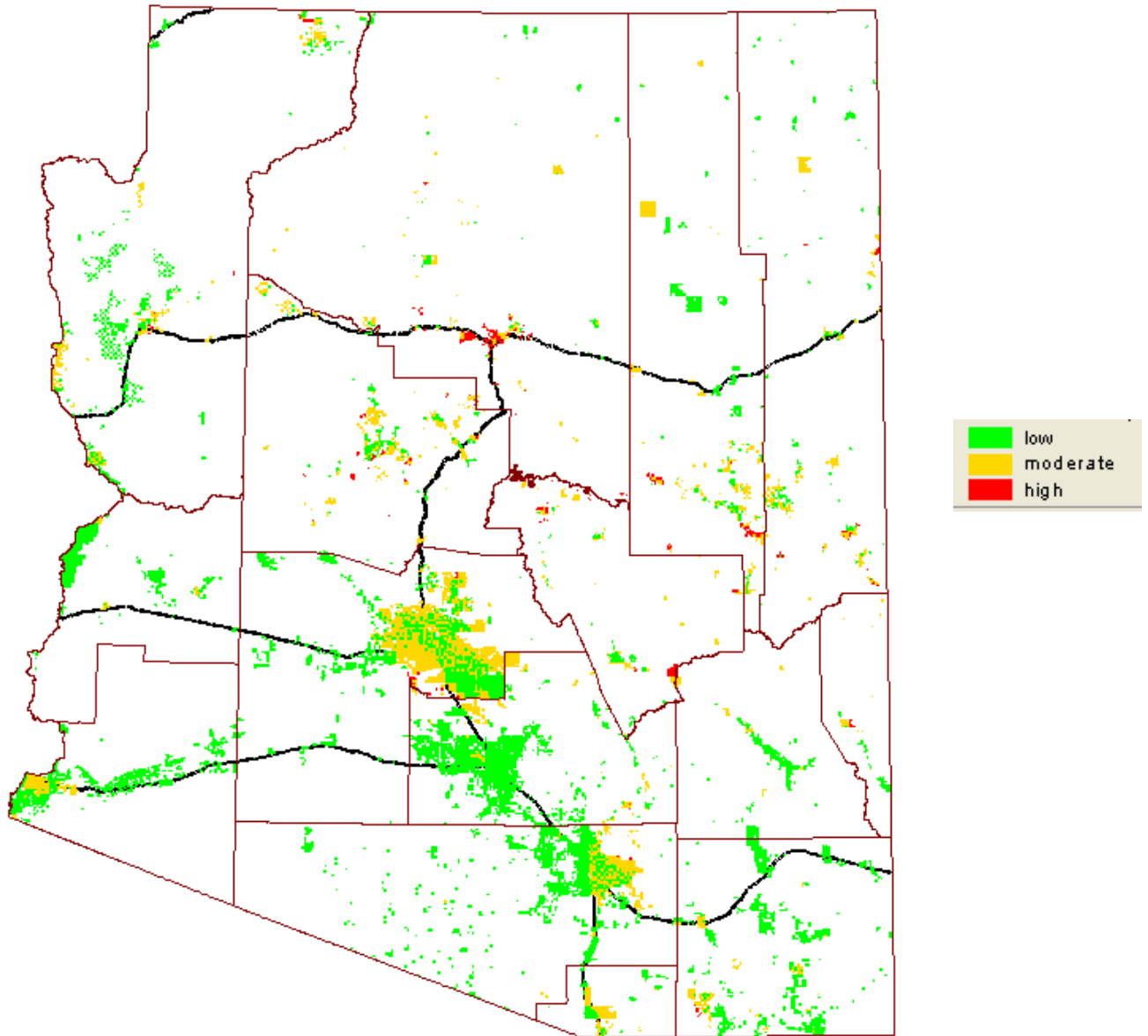
Place	WUI POINTS	RATING
Old Blanco	4	Low
Owl	4	Low
Page area	4	Low
Papago Farm	4	Low
Parker area	4	Low
Peach Pu	4	Low
Pia Oik	4	Low
Picacho	4	Low
Pisinimo	4	Low
Pitoikam	4	Low
Plamosa	4	Low
Planet	4	Low
Plomosa	4	Low
Queens Well	4	Low
Raso	4	Low
Rio Rico SW	4	Low
Roosevelt	4	Low
San Agustin	4	Low
San Lucia	4	Low
San Miguel	4	Low
San Rafael	4	Low
San Vicente	4	Low
Sanchez	4	Low
Santa Claus	4	Low
Saud Wells	4	Low
Shaotkam	4	Low
Sombrero Buttel	4	Low
South Cove	4	Low
South Komelik	4	Low
Stanwix	4	Low
Tanque	4	Low
Tarton	4	Low
Toltec	4	Low
Toltec area	4	Low
Topock	4	Low
Troy	4	Low
Vapolo Havoka	4	Low
Vaya Chin	4	Low
Vicksburg	4	Low
Wickchoupai	4	Low
Willow Beach	4	Low
Yazzi	4	Low
Yucca	4	Low
Allenville	3	Low
Apache Grove	3	Low
Camel	3	Low
Chloride	3	Low

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Place	WUI POINTS	RATING
Coronado Generating Station	3	Low
Coshise County Junior College	3	Low
Cotten Center	3	Low
Dennehotso	3	Low
Five Mile Creek	3	Low
Five Mile Landing	3	Low
Forest Airport	3	Low
Found Crossing	3	Low
Goodwater	3	Low
Graham	3	Low
Gurli Put Vo	3	Low
Hayden Junction	3	Low
Hollywood	3	Low
Kansas Settlement	3	Low
Ligurta	3	Low
Lukachukat	3	Low
Mexican Water	3	Low
Mexican Water Trading Post	3	Low
Morenci	3	Low
Newfield	3	Low
Portland Junction	3	Low
Rainbow Valley	3	Low
Ray	3	Low
San Bernardino Ranch	3	Low
San Dionysio	3	Low
Sand Spring	3	Low
Tatkum Vo	3	Low
Tes Nex lah	3	Low
Webb	3	Low
Castle Rock	2	Low
Cove	2	Low
Rock Point	2	Low

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Land Hazard

